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# AN ELECTRONIC MARKET FRAMEWORK FOR CONTEXT-SENSITIVE MOBILE CONSUMER PROFILES IN THE MARKETING DOMAIN

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## Abstract

*The mobile online medium (i.e. mobile data communication) allows the creation of context-sensitive profiles for mobile consumers by using identity- and context information and thereby enabling the efficient targeting of current consumers' needs. However, current implementations of Mobile Marketing activities do not make use of these beneficial unique features and apply, for instance, content-based targeting approaches. In order to enable the use of context-sensitive profiles in Mobile Marketing activities, this paper identifies the need for an electronic market for these profiles and applies a Market Engineering approach to derive an electronic market framework for context-sensitive mobile consumer profiles in the Mobile Marketing Domain.*

## Keywords

*Mobile Marketing, Electronic Markets, Mobile Context-sensitive Consumer Profiles, Market Engineering*

## Introduction

Online Marketing campaigns carried out using the mobile medium (i.e. mobile data communication) are mostly subsumed under the term *Mobile Marketing* or *Mobile Advertising* (Leppanen et al. 2006). Although, literature does not provide a common understanding regarding these terms, it is agreed that their unique features notably contribute to the benefits of online marketing activities (Barwise and Strong 2002, Salo and Tachinen 2005, Wohlfahrt 2001). Therefore, the mobile network offers the ability to distinctly identify its mobile users, determine their current location and time of usage (Figge and Theysohn 2006). If applicable, by enriching this information with provided consumer profiles and integrating those into a context-sensitive mobile consumer profile, the prerequisites for the Permission- and One-to-One Marketing paradigm (Barwise and Strong 2002, Peppers and Rogers 1997) are provisioned. In addition, the ability to establish a location- and time independent communication between mobile consumers and advertisers (Decker et al. 2006) provides the foundation for high efficient promotional Mobile Marketing activities.

Examining the current Mobile Marketing market, basically two types of Mobile Marketing implementations can be found:

- *Text message based advertisements (Push/Pull)*. Advertisers either send text messages to the mobile phone of consumers (Push) or are using other media such as TV, radio, print, or On-Pack promotions (Pull) in order to have the consumer initiate the communication by himself. The targeting occurs mainly based on in advance collected consumer profiles (Push) or based on the content provisioned for the consumer (Pull) (Lippert 2004).
- *Text/Banner advertisements on mobile websites (Pull)*. Like in the stationary internet, text/banner advertisements are displayed on mobile websites. Targeting is mainly implemented based on the content of a mobile website (AdMob 2007, Screen Tonic 2007).

By comparing the outlined potential of the mobile medium with the Mobile Marketing implementations currently in the market, a deficit is revealed. Up to now, there are no Mobile Marketing activities offering consumer advertisements according to their *current needs* and *situation*. There are no approaches requiring a consumer initiation (current need),

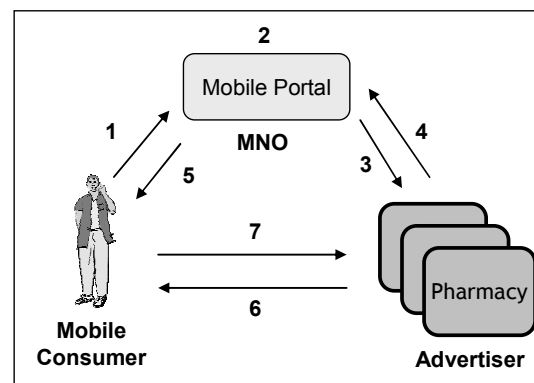
integrating profiles (based on the identity) and the current situation (current location and time of usage) in order to target advertisements (Decker et al. 2006, Roesch 2006).

### ***Integration of Identity- and Context Information into Mobile Marketing Activities***

In order to lay the ground for addressing the identified deficit in the current Mobile Marketing market, additionally to content-based targeting, context-sensitive profile-based consumer targeting on mobile websites/portals has to be introduced. While consumer profile-based marketing activities are not new and already well established in the area of (Mobile) Customer Relationship Management (CRM), they still require an existing relationship between advertiser and mobile consumer (Aschmoneit 2004). But by taking advantage of the unique features of mobile medium, it is instead possible to create at least a basic context-sensitive consumer profile at the initiation of the communication between mobile consumer and advertiser (e.g. at the logon to a mobile website). These kind of mobile profiles are not intended to not reach the targeting efficiency of CRM measures, but Figge and Theyson (2006) as well as Wiedemann (2006) show in their conducted expert interviews/surveys that advertisers believe in the potential of mobile consumer profiles to outperform the current content-based approaches.

### ***A fictive application scenario for Context-sensitive Mobile Consumer Profiles in the Mobile Marketing***

A fictive *Pharmacy Finder* service should further illustrate a possible application of context-sensitive mobile consumer profiles in the Mobile Marketing (figure 1). A mobile consumer being in an unfamiliar area of a large city, searches for a pharmacy in his immediate vicinity. Therefore, he logs onto the Mobile Information Service Portal (1) of his mobile network operator (MNO). The mobile consumer is then presented with several portal categories. He selects the category *Healthcare* and enters the search query *Pharmacy*. This triggers the MNO to compile the marketing-related information (identity, current location, time of usage, etc.), actively shared by the mobile consumer, to a context-sensitive mobile consumer profile (2). In the following, the MNO queries all pharmacies having registered for the keyword *Pharmacy* and matching the consumer targeting profile definition of the advertisers (3). The MNO now shows those pharmacies (4&5) in walking distance while at the same time considering their opening hours. Given the mobile consumer's interest, the promotional communication between him and a pharmacy of his choice begins (6) and may be turned into a business transaction later on (7).



**Figure 1. Application of context-sensitive mobile consumer profiles in Mobile Marketing**

### ***An electronic market for Context-sensitive Mobile Consumer Profiles***

Mobile consumer profiles are digital datasets which need to be matched with and delivered to the appropriate advertisers in real-time upon a mobile consumer's request. In contrast to the CRM area, a potential consumer contact does not have an existing business relationship with a specific advertiser. Instead advertisers are demanding such consumer contacts from suppliers (i.e. mobile website operators) and thereby implicitly creating an *electronic market* (Schmid 1993).

In order to design of such an electronic market, it is not simply possible to use an existing e-commerce advertiser market reference model. The integration of identity- and context information into consumer profiles makes each consumer profile instantly unique, resulting in an individual valuation by each advertiser. Additionally, there are several other implications which will be addressed in the following chapters.

The objective of this work is to select and use an existing framework and process model for the design of electronic markets and derive a corresponding framework and process model for context-sensitive mobile consumer profiles in the Mobile Marketing domain. Therefore, the remaining part of this paper is organized as follows. The next chapter provides an overview of related work concerning the integration of identity- and context information into Mobile Marketing activities. Subsequently, the Market Engineering approaches of Weinhardt (2003), Holtmann (2004) and Neumann (2004) as foundation for a structured process model and framework for the design of electronic markets are introduced. Based on these concepts, the following chapter derives a specific framework for the electronic market of context-sensitive Mobile Marketing activities. Finally, the paper concludes in the last chapter and provides an outlook of future research work.

## Related Work

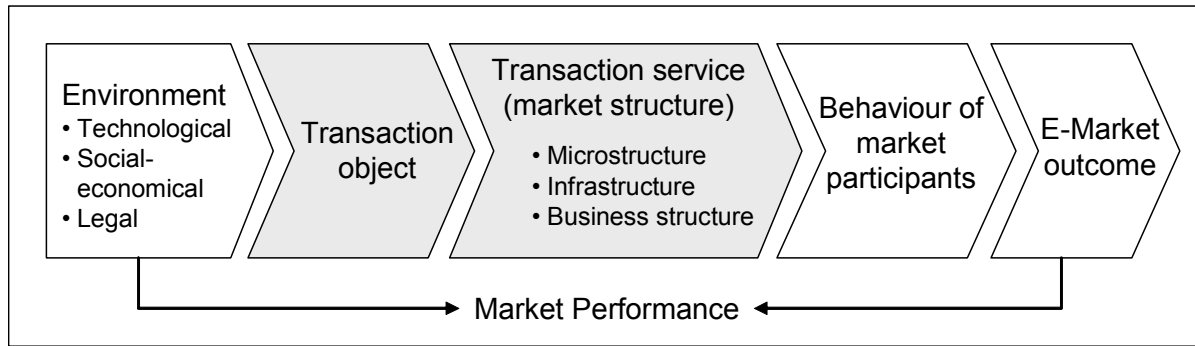
There are several research approaches integrating identity- and context information into Mobile Marketing activities. The MoMa System (Bulander et al. 2005), the SMMART System (Kurkovsky and Harihar 2006) and Freezones (Figge 2007) compare context-sensitive consumer profiles and advertiser's target group definitions rule-based and present the consumer with relevant matches on his mobile device. The consumer is then able to choose from relevant advertisements. The Ad-Me System (Hristova and O'Hare 2005) functions in a similar way, but additionally incorporates the fees paid by the advertiser into the matching process. Tripathi (2003) presents decision models for wireless advertising companies optimizing the delivery time of text message-based context-sensitive promotional messages as well as their pricing from a provider's perspective. Albers (2007) discusses basic design aspects for the allocation mobile context-sensitive consumer contacts based on a multi-dimensional auction mechanism, but does not extend this concept to broader vision of an electronic market.

The presented research approaches show that market-driven coordination and allocation of mobile consumer profiles is at an early stage. In contrast, there are several mechanisms in the e-commerce market (stationary internet) already in use for several years. The most prominent examples are leading internet search engine providers such as Google (2007), auctioning advertising space to be displayed when a consumer enters a specific keyword or search query. Similar auction concepts in the mobile internet domain are offered by advertising companies such as Ad Mob (2007) or Screen Tonic (2007). But those approaches are rather selling homogeneous advertising space than unique context-sensitive mobile consumer profiles and therefore can only serve as foundation for this new concept.

## The Market Engineering Approach

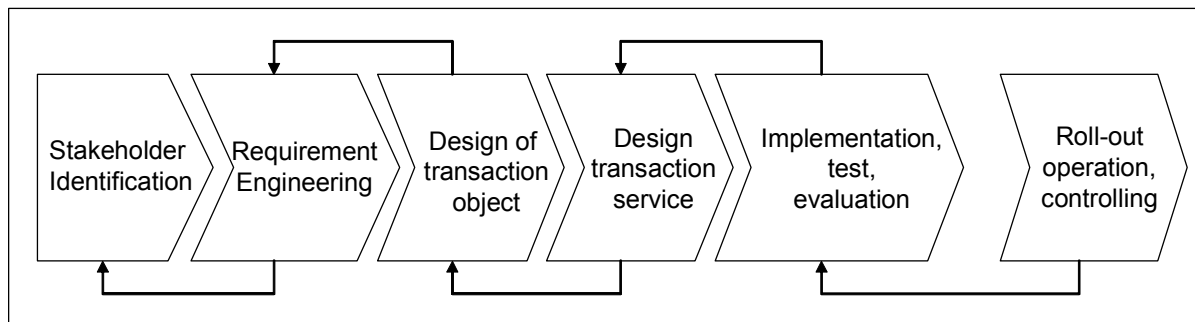
According to Schmid (1993) an electronic market is one, which supports at least one part of its transactions electronically. Further, these markets are markets which are designed for a specific outcome and do not evolve as traditional ones (Neumann 2004). This desired market outcome is highly affected by the many parameters of a concrete market (e.g. number of market participants and their actions, market access restrictions, etc.) resulting in market design being a very complex, error-prone task (Weinhardt et al. 2003). The Market Engineering approach evolved from the Service Engineering domain and was at last shaped by Weinhardt et al. (2003), Neumann (2004) and Holtmann (2004). It provides a structured process model and framework for the design of electronic markets. While existing models for electronic markets such as Lindemann and Schmid (1999) or Stroebel and Weinhardt (2003) only address the design of the allocation respectively pricing mechanisms, the Marketing Engineering approach integrates, in addition to the classical market microstructure, the business structure, the IT-infrastructure and the legal environment into the framework (Weinhardt et al. 2003, Neumann 2004, Holtmann 2004). These Market Engineering aspects nicely address the characteristics of current mobile markets which are typically highly regulated and competitive while requiring a critical IT-infrastructure.

Figure 2 depicts the design framework of an electronic market based on Weinhardt et al. (2003). It shows that the design of an electronic market is at first mainly affected by the *technological*, *social-economical* and *legal environment* which can not be influenced by the market designer. The tasks of the designer are, based on the described aspects, to map the characteristics of the *transaction object* into the electronic market (i.e. enabling its trading) and to model the *transaction services* – which at least influences the behavior of the market participants.



**Figure 2. Framework for creating an electronic market based on Weinhardt et al. (2003)**

The *transaction object* and *market structure* (consisting of market microstructure, infrastructure and business structure) are developed based on an iterative process model depicted in figure 3. It begins by identifying the stakeholders (phase 1) and is followed by conducting a requirements engineering (phase 2). Based on the latter, the mappings of the transaction object into the electronic market takes place (phase 3). Subsequently, the transaction service (market structure) is developed (phase 4) and afterwards implemented/tested (phase 5). Finally, the implementation is rolled out for operation (phase 6).



**Figure 3. Market Engineering process based on Weinhardt et al. (2003)**

## Design of an Electronic Market Framework for Mobile Consumer Profiles

The presented Market Engineering approach presented in the last chapter is now used in order to derive an electronic market framework for context-sensitive mobile consumer profiles in the Mobile Marketing domain. Therefore, this chapter walks through the presented Market Engineering design process from phases 1 to 4. Addressing phases 5 and 6 is not part of this work since it would require a distinct market design for a specific Mobile Marketing activity. Nevertheless, the potential mobile medium specifics in these phases needs to be analyzed in future research work.

### *Stakeholder Identification (Phase 1)*

The stakeholders of an electronic market for mobile consumer profiles can be divided into market operator, platform provider, advertisers and mobile consumers. The market operator runs the market place while the platform provider maintains the technological infrastructure. The market operator acts as *market maker*, i.e. he generates mobile consumer profiles using his mobile website/portal and offers them to the advertisers. He is also a trusted party for mobile consumers in order to maintain their willingness to accept marketing activities and to make them share their personal information (Bauer et al. 2005).

*Advertisers* can be retailers or advertising agencies acting on the behalf of the former. These advertisers are typically those who extend existing marketing activities to the mobile media, since successful Mobile Marketing activities have to be integrated into their media mix (Roesch 2006, Leppaniemi et al. 2006).

*Mobile consumers* are special actors in this market. They are neither seller nor buyer, but their acceptance of the Mobile Marketing activities is highly influenced by the matching with the appropriate advertisers (Meier 2001, Feldmann 2005).

## Requirements Engineering (Phase 2)

Based on the identified stakeholders, the requirements of the roles *market operator*, *advertiser* and *mobile consumer* are acquired.

The natural aim of a *market operator* is to archive maximal profit from the operation of the market place. In order to do so, he most importantly needs to determine the optimal price for each mobile consumer profile derived from an advertiser's maximal willingness-to-pay (i.e. price differentiation (Skiera 2005 et al.)). In the traditional mass media, consumer contacts are priced based on the *Thousand-Contact-Price (TCP)*. This is the price for reaching a thousand recipients of a particular medium with specific population coverage and defined consumer characteristics (Bogs 2001). With the integration of identity- and context information into Mobile Marketing activities, mobile consumer contacts can now be addressed as individuals from a marketing perspective. Therefore, the scarce market resource is no longer broadcast time or the advertisement space on a specific medium as found in traditional mass media. Instead, it is now the attention of an individual mobile consumer related to his current situation and current needs. This results in an individual advertiser's willingness-to-pay for *context-sensitive consumer profiles* (e.g. due to the individual distance between an advertiser's Point-of-Sales (POS) and a mobile consumer).

From the *advertiser's* perspective, there are two fundamental requirements which need to be addressed. First, there is a need for a large enough amount of mobile consumers generated by the mobile contact space (e.g. mobile portal web site) in order to achieve a sufficient probability of reaching consumers whose profiles match their desired consumer target group definitions of advertisers (Bogs 2001). Secondly, in order to archive a high efficiency of their mobile marketing activities, advertisers need to define their individual search- and matching criteria, enabling themselves to select their most valuable potential mobile consumers.

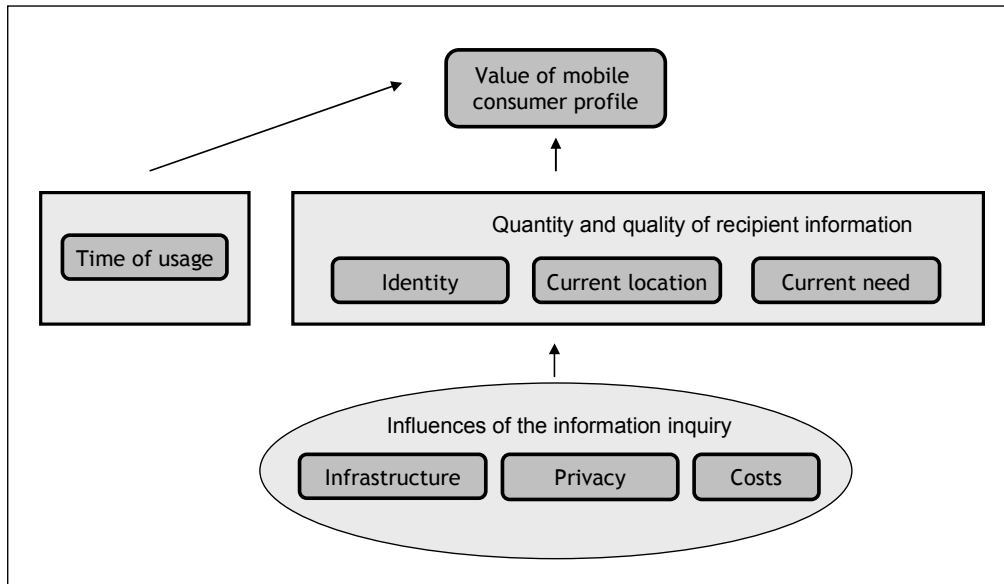
*Mobile consumers* expect to be offered relevant marketing activities satisfying their current needs. Irrelevant advertisements are easily found disturbing and can lead to the refusal of marketing activities (Meier 2001, Feldmann 2005). They further demand to actively to maintain their privacy by controlling and monitoring which of their personal information is shared or transferred to the market operator in order to feed the matching process between the advertiser and them. The more information they share, the more effective the targeting of marketing activities can be. But mobile consumers demand (monetary) incentives from the advertisers (e.g. coupons) in return for the sharing of personal information (Award and Krishnan 2006). Additional factors affecting the consumer acceptance of Mobile Marketing activities (e.g. such as the design, content or incentives of a mobile advertisements) are not covered in this work.

## Design of transaction object (Phase 3)

The product *context-sensitive mobile consumer profile* (transaction object) constitutes a digital dataset which stores all acquired information about a mobile consumer at the time of its creation. In order to make the mobile consumer profile a tradable object, at first a common understanding for this object between advertisers, market operator and mobile consumers needs to be established (Figge 2007). This provides consistent communications between advertisers and the market operator (matching of consumer profiles and target group definitions) and between the market operator and mobile consumers (for maintaining the sharing of personal information for privacy reasons).

The basic mobile consumer profile information provided by the mobile network is the *identity* of a mobile consumer in terms of a pseudonym, his *current location* (e.g. based on the postal code) and his *current need*. In addition, the *time of usage* (indicating time of a current need) is also important, but can always be retrieved without any prerequisites. This information can be further enriched with additional information such as an attached *personal profile* (e.g. containing gender, age, education and interests' related information etc.).

The quantity and quality of these identity- and context information may vary considerably due to infrastructure requirements (e.g. GPS device available), possible cost restrains (e.g. for acquiring identity- and context information) (Albers et al. 2005) and the individual privacy attitudes of mobile consumers (Ng-Kruelle et al. 2002). Figure 4 provides an integrated overview of the identified relevant information about a mobile consumer and their quantity and quality affecting factors.



**Figure 4. Value of a context-sensitive mobile consumer profile based on its affecting factors**

### ***Design of transaction service (Phase 4)***

The design of the transaction service is constituted by the market microstructure, infrastructure and business structure for the electronic market for mobile consumer profiles. The following chapters derive the design of these components based on the described requirements of its actors.

### **Market Microstructure**

The aim of the market operator is to maximize his profit. Therefore, he needs to charge each advertiser the optimal price for a mobile consumer profile – which is the equivalent of the advertiser's maximal willingness-to-pay. In doing so, he has to face the following specifics of context-sensitive mobile consumer contacts:

- The scarce market resource for advertisers is attention of an individual mobile consumer. This is different to the traditional mass media where, for instance, the TV broadcast time is the competitive resource. Refer to Bohte et al. (2004) for work on allocating consumer attention in an e-commerce setting.
- The uniqueness of context-sensitive mobile consumer profiles results (due to the integration of identity- and context information) in an individual willingness-to-pay for mobile consumer profiles by each interested advertiser (Albers 2007).
- If a context-sensitive mobile consumer profile can not be sold to an advertiser at the current time, its value invalidates and this resource is wasted (Lee and Szymanski 2006).
- In contrast to the stationary internet, the deep integration of mobile communications and devices into the personal sphere of users, mobile consumers are more easily disturbed by irrelevant marketing activities compared to other media (Meier 2001, Feldmann 2005).

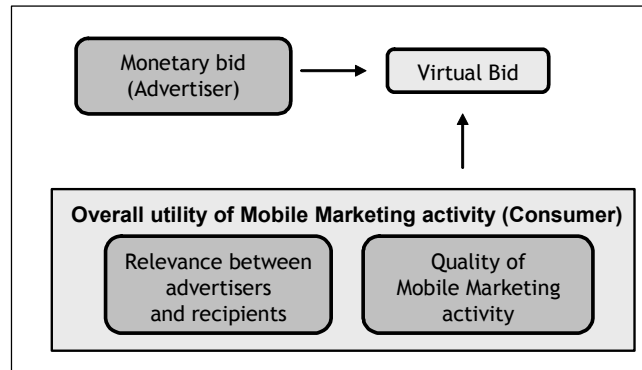
In order to address the complex specifics of mobile consumer profiles above (from a market operator's perspective), this work follows the recommendation of Skiera et al. (2005) to apply an interactive, dynamic allocation or pricing mechanism respectively. In doing so, an auction mechanism is proposed in order to translate the problem of determining an optimal price into one of designing an optimal pricing mechanism.

Since a concrete auction design depends on the specific Mobile Marketing activities, only basic design requirements can be described within the mobile market framework:

- *Auction type/duration*: In order to ensure the real-time delivery of advertisements for mobile consumers, only non-iterative auction types with an immediate/fixed end such as the First-Price and Vickrey-Auctions (Klemperer 2003) can be used.
- *Auction participants*: In order to avoid SPAM for mobile consumers due to false or inappropriate information of or about advertisers, only certified advertisers are allowed to participate in this auction (Meier 2001, Feldmann 2005).

- *Scoring advertisers' bids*: The likely possibility of disturbing consumers with irrelevant marketing activities has to be explicitly addressed by the market operator. An example of a prospective approach is the introduction of a utility function in order to score the bids (Strecker 2004) of advertisers. This enables the market operator to influence the matching between mobile consumers and advertisers.

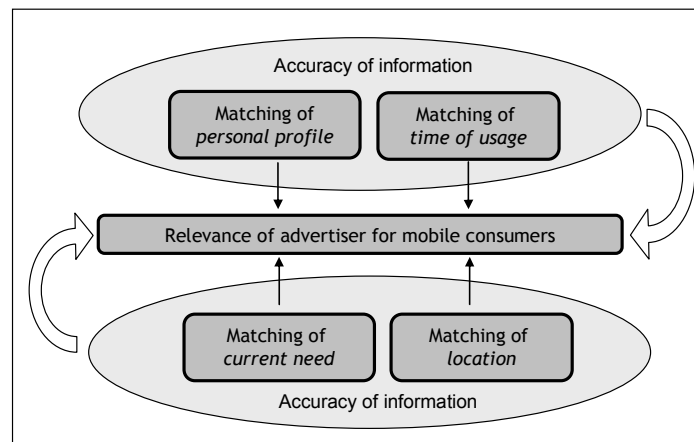
Figure 5 depicts the suggested possible factors constituting the *virtual bid* within the auction mechanism. The first factor is the monetary bid of the advertiser (assumed to correspond with his willingness-to-pay). The second factor is the utility of the Mobile Marketing activity for the mobile consumer. This utility can be further divided into a utility resulting from the relevance between mobile consumer and advertiser and a utility resulting from the quality of the actual advertisements (contents, design, etc.). The calculated overall utility can then be used in order to level or score respectively the monetary bid of the advertiser.



**Figure 5. Factors constituting the bidding within the auction mechanism**

The quality of marketing activities as depicted in figure 5 can not be directly benchmarked on a quantitative basis and is therefore not further covered in this work. Although, it should be noted that it is still an important aspect, which is already addressed in practice, for instance, by the internet search engine Google (2007) using the click-rate of advertisements as an indirect measurement.

In contrast to the quality aspects described above, the relevance (matching) of an advertiser's consumer target group definition and mobile consumer profile can be calculated on a quantitative basis. The potential factors affecting this relevance are depicted in figure 6.



**Figure 6. Factors affecting the relevance between advertisers and mobile consumers**

The matching of a mobile consumer's *identity* (i.e. personal profile), *current need* (e.g. entered search query) and *time of usage* with an advertiser's target group definition is a straight forward process regularly applied in the marketing (Kotler and Blimel 2001). In contrast, the calculation of the utility for the *distance* between a mobile consumer and a potential Point-of-



Sale (POS) requires a rather new approach. Up-to-date Geo-Marketing concepts are usually analyzing the static spatial environment for marketing activities (Bucklin 1971), but can be translated and used in the Mobile Marketing context. An example for a possible approach is the application of the Huff Model. Huff (1964) shows in his spatial model that the probability of a consumer entering a POS is based on its *attraction* (i.e. size of POS; a larger POS is assumed to offer a greater number products) and the *distance* between POS and the consumer. Now, if one interprets the quality of the matching between mobile consumer and advertiser (i.e. regarding current need, personal profile and time of usage) as *attraction* in the sense of Huff (1964) and puts it into relation to the *distance* between POS and a mobile consumer, then this relevance can be calculated based on the Huff model (see figure 7).

$$\frac{\text{Matching (Current need, Personal profile, time of usage)}}{\text{Distance (Point-of-Sale)}} = \text{Relevance of Advertiser}$$

**Figure 7. Calculation of the relevance (utility) between advertisers and mobile consumers**

### Infrastructure

In order to implement an auction mechanism addressing the already identified requirements and derived design aspects, the technical IT-infrastructure has to ensure that the appropriate context-sensitive mobile consumer profile information can be acquired and the auction mechanism is executed and finished in real-time.

In order to avoid any delays in the provision of mobile advertisements (e.g. because of sophisticated trading mechanisms for mobile consumer contacts), context-sensitive consumer profiles and consumer target group definitions need to be centrally stored on a server of the market operator. This avoids potential communication delays with the involved parties during an auction round and protects the privacy of the mobile consumers (refer to Google 2007, Yahoo 2007, AdMob 2007, Screen Tonic 2007 for similar approaches). In this context, the work of Albers et al. (2005) shows how this kind of context-information (in particular location information) for consumer profiles can be acquired from multiple sources, centrally stored, and managed.

In addition to ensuring the real-time requirement, advertisers need to *automatically* determine their willingness-to-pay for a certain mobile consumer profile and subsequently compute this value into an auction bid. Here, a similar design, as shown in the chapter *Microstructure*, can be an example for a potential feasible approach. An advertiser defines the specifics of his ideal mobile consumer contact (see figure 6 for details) and puts it into relation to the actual mobile consumer profile provided by the market operator. The calculated expectancy value is subsequently multiplied with the specified advertising budget per mobile consumer resulting in the bid for the mobile consumer profile (see figure 8).

$$\frac{\text{Actual consumer profile}}{\text{Ideal consumer profile}} \times \text{Advertising budget per consumer} = \text{Bid for consumer profile}$$

**Figure 8. Advertiser's calculation of a monetary bid for a potential mobile consumer profile**

### Business Structure

The business structure or model of a market operator is comparable to existing ones in the Electronic or Mobile Commerce. In this context, Google (2007), Yahoo (2007), AdMob (2007) and Screen Tonic (2007) are already auctioning advertising space for stationary and mobile websites. But the main difference between selling context-sensitive mobile consumer profiles instead of website advertising space is that the marginal costs for mobile consumer profiles do *not* converge to zero. This is because the acquisition of identity- and context information for mobile consumers generates constant variable costs. On the one hand mobile consumers expect monetary incentives for providing personal information (Award and Krishnan 2006) and on the other hand, a MNO charges the market operator for the provision of identity- and context information of mobile consumers using his mobile network (Albers et al. 2005). For an extensive outline of one possible business structure for MNOs in this context refer to Figge (2007).

## Conclusion and Future Work

The paper at hand presented a framework of an electronic market for context-sensitive mobile consumer profiles to be applied in the Mobile Marketing domain. The unique features of mobile data communication such as determining identity- and context information of mobile consumers enable advertisers to target consumers' needs more efficiently by providing mobile consumers with more relevant marketing activities. However, the integration of identity- and context information makes, in contrast with the traditional mass media, mobile consumer profiles unique to interested advertisers and thereby implies an individual willingness-to-pay. In order to address this new situation, an auction mechanism is required replacing the current static pricing mechanism of the traditional media industry. Thereby, advertisers are supposed to determine the price for a mobile consumer profile (based on available identity- and context information). In this context, the complex market environment of the mobile domain shows that the design of a new allocation mechanism is not sufficient enough. Instead, several important mobile medium specifics need to be addressed and translated into a framework for an electronic market of context-sensitive mobile consumer profiles as well. Thereby, the Market Engineering approach by Weinhardt et al. (2003), Holtmann (2004) and Neumann (2004) served as a template, used to derive the electronic market framework the context-sensitive mobile consumer profiles.

Concerning future research work, it is planned to evaluate the outlined concept, currently based on existing literature, against the actual requirements of practitioners in the Mobile Marketing Domain. Therefore a number of expert interviews are going to be conducted since a case study research would require at least one already existing electronic market for context-sensitive mobile consumer profiles. In addition, it is planned to build a prototype in order to proof the technological feasibility of this approach while especially focusing on the auction real-time requirements.

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